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Family orientation, strategy and organizational learning as predictors of knowledge management in Dutch SMEs:

A quantitative study

Haibo Zhou, Sita Tan and Lorraine Uhlaner

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Abstract

Knowledge management (KM) is becoming a growing concern in management research and practice because of its role in determining firm innovation capability and in enhancing working life quality of knowledge workers. Although research and policy interest in KM is beginning to grow for small and medium-sized suppliers, still relatively limited attention has been paid to understand the specifics of KM issues of SMEs in particular. Previous studies rely on either qualitative case studies or very small samples. In this study, we will investigate KM among SMEs using empirical data from about 2000 SMEs. The aim of this study is to investigate the prevalence of different KM techniques and the determinants of KM.

Data was collected through telephone interviews in 2006. These interviews were designed to investigate the prevalence of different KM techniques. OLS was used to address the determinants of KM.

We found that SMEs are most likely to acquire knowledge by staying in touch with professionals and experts outside the company. Also, SMEs are most likely to share knowledge and experience by talking to each other and to store knowledge in formal repositories. Furthermore, we found a significant positive relationship between organizational learning and strategy and knowledge management, as well as a significant negative relationship between family orientation and knowledge management.

In conclusion, knowledge management practices are not independent from other resources and processes inside SMEs. Therefore, there is no all-in-one knowledge management practices package for all types of SMEs across industries.

Contents

1 Introduction

1.1 Background and motivation

Western economies are increasingly viewed as knowledge-driven (Audretch and Thurik, 2001, 2004). Knowledge management (KM) is a relatively new term that encompasses not only the related notions of knowledge transfer and knowledge sharing (externally from other firms to the small firm and/or internally among firm members), but the entire knowledge acquisition and utilization process, beginning with locating and capturing knowledge (including tacit knowledge which is difficult to codify), and followed by the enabling of that knowledge within the firm (Choo and Bontis, 2002; Takeuchi and Nonaka, 2004). KM is becoming a growing concern in management research and practice because of its role in determining firm innovation capability and in enhancing working life quality of knowledge workers (Corso, Martini, Pelligrini, and Paolucci, 2001). A report by Business Intelligence (quoted in Numri, 1998) claims that successful KM programs can produce up to tenfold returns, thus indicating that KM might also have a positive effect on firm performance.

To date, some of the most extensive research on knowledge transfer and sharing relates to the nature of networks among (larger) firms and between such firms and public institutions (research institutes, universities, etc.). However, research over the past thirty years repeatedly shows patterns that a disproportionate amount of innovation (including new patents and other inventions and discoveries) comes from small to medium-sized firms (Thompson and Leyden, 1983; Acs, 1996). Therefore, it is of interest how small firms perceive and practice KM to foster innovation within their own firms, and, how they feed their own knowledge and innovations back to other firms (see also Prince and Brecht, 2000).

Although research and policy interest in KM is beginning to grow for small and medium-sized suppliers (e.g. Sparrow, 2001; Wong and Radcliffe, 2000), still relatively limited attention has been paid to understand the specifics of KM issues of SMEs in particular. One of the earliest studies on KM in SMEs was carried out by Uit Beijerse (1999), who found that SMEs frequently face the problem of sharing and retaining knowledge due to turnover of experienced staff. Further complicating the problem is that much knowledge is "tacit", which makes it difficult to codify (Koskinen and Vanharanta, 2002). Recent research by Uhlaner and Van Santen (2005) identifies a link between KM practices and quality performance ratings, especially among SME suppliers of manufacturers. Another study by van Rijnswou (Rijnswou, 2005) finds a possible linkage between knowledge sharing practices and innovation among SMEs. Two other studies, one by Hellenthal (2005) and another by Sabatier, Nelson and Nelson (2005), examine some of the predeterminants of types of knowledge sharing behaviours and other KM practices. But common to all these studies are methods that rely on either qualitative case studies or very small samples.

In this study, we will investigate KM among SMEs using empirical data from the Dutch SME policy panel which addresses about 2000 SMEs. The aim of this study is to test a preliminary model that not only addresses the determinants of KM, but also the prevalence of different KM techniques, based on these data.

1.2 Problem statement

The objective of this study is to investigate knowledge management in SMEs and to identify the relationship between organization context and KM approaches in SMEs. Furthermore we aim to identify the relationship between KM and organizational learning controlling for organization context.

Given the objective, this study aims to answer the following research questions:

1 How do SMEs manage their knowledge? In particular, how do they acquire and/or develop, share or distribute, and store knowledge within the firm?
2 What is the relationship between certain organization context variables and KM approaches in SMEs?
3 What is the relationship between organizational learning and KM approaches in SMEs?

1.3 Organization of the paper

This article consists of five sections. In Section 2, literature on main concepts and past relevant research are reviewed. The conceptual framework and hypotheses of this study are formulated based on a literature review. Section 3 presents the methods used, including sampling, data collection techniques, explanation of the variables and data analysis to be followed. The results and initial discussion regarding support of hypotheses are presented in Section 4. Section 5 covers further discussion, including limitations of this study and suggestions for future research. Conclusions and practical implications of this study are also discussed.

2 Research framework and hypotheses

In this section, a research framework and hypotheses are formulated based on theoretical concepts and empirical results.

2.1 Overview of key concepts

In this section, the key concepts of this study are described in detail. Given the research questions, key concepts of this study are knowledge management, certain organization context variables and organizational learning.

2.1.1 Knowledge management

It is difficult to define the concept of knowledge management due to the fact that it has been studied by several disciplines and from different approaches (Lopez, Montes Peon and Vázquez Ordás, 2004). The definition of knowledge management in this study is based on Takeuchi and Nonaka (2004), Uit Beijerse (1999), von Krogh et al (2000) and van Santen (2002). Common to their definitions is the identification of three phases of knowledge management to unlock tacit knowledge. These phases include: 1) capturing and locating knowledge; 2) transferring and sharing knowledge; and 3) Enabling knowledge. Enabling practices will be excluded from the present research due to the difficulties encountered in previous studies. For instance, in the study of Van Rijnswou (2005), he found that although most of the interviewed firms answered how they applied knowledge, there did not seem to be a clear indication of what this process exactly entails. In the interview section on enabling practices, few if any of the respondents were able to elaborate on the enabling strategies independently of either of the first two phases and/or outcomes of innovation performance.

"Knowledge capturing and locating practices" is mainly concerned with unlocking tacit knowledge into explicit knowledge (Nooteboom, 2001). Nooteboom suggests that tacit knowledge can be externalized through discussion among colleagues as well as connecting with experts and other organizations, joining all kinds of formal or informal activities. Data warehousing is another capturing and locating practice (Krogh, et al, 2000). This practice is mainly concerned with repositories of books and manuals, knowledge management system(KMS), ERP and file-systems (both computerized and non-computerized) where knowledge is held.

"Knowledge transferring and sharing practices" also involve a combination of ICT and non-ICT solutions (Uhlaner and van Santen, 2005). Non-ICT solutions are important for a variety of reasons. On the one hand, they are also used by firms with a lack of technological sophistication. On the other hand, some knowledge, especially tacit knowledge, can not be transferred easily because it can not be codified in a database (Davenport and Prusak, 1998). Nooteboom (2001) states that knowledge may only be transferred by comparatively lengthy, direct, on-line, real-time interaction, with demonstration, trial, error and correction, which is a problem for tacit knowledge.

Therefore, tacit knowledge can be transferred either by individuals - for instance, acquiring a new worker who carries tacit knowledge into the firm while practicing and transfers it on the basis of the ongoing interaction needed (Uhlaner and van Santen, 2005)- or through informal knowledge management practices such as community of practices[1].

In addition to knowledge management practices, the culture of knowledge management which allies with organizational culture is another important perspective. Nonaka and Takeuchi (1995) illustrate the difference between two types of knowledge related cultures by comparing Honda (exploration oriented) and General Electric (exploitation oriented). They find that employees are more willing to share, use and create knowledge in Honda, which encourages them to build new knowledge constantly, than in General Electric, which focuses on using existing knowledge. In an exploration oriented culture, knowledge is managed in a more proactive and strategic way compared to an exploitation oriented culture. In this study, we develop a variable scale for knowledge management including questions on "Knowledge capturing and locating practices", "Knowledge transferring and sharing practices" and knowledge related culture as three aspects of the knowledge management concept.

2.1.2 Organization context

Organization context presents the characteristics of a firm. It includes general organization context variables such as firm size, age, culture and ownership structure, as well as family orientation and strategy, which are identified as having an influence on knowledge management in the study by Uhlaner and van Santen (2005). Some of these context variables have been identified as having an influence on knowledge management practices in large firms in several studies (Mohan-Neill, 1995; Sparrow, 2000; Nooteboom,2001; Yli-Renko, Erkko and Sapienza,2001). In this study, general organization context is used as a common control variable for each analysis. Family orientation and strategy are key context variables which need to be identified based on this study.

Family orientation

The earliest and still more broadly adopted structural definition of family orientation was developed by London Business School (Stoy Hayward, 1989). According to this definition, a firm is classified as a family business if more than 50% of shares are owned by one family, or at least 50% management are from one family, or/and a significant number of members of the board are from a single family. However, it is problematic that most of the small firms are classified as family firms by this definition (Klein, 2000). Due to such limitations, most recently developed definitions of family business reflect the acceptance of multiple dimensions as well as the notion that rather than creating a dichotomy, different firms may vary in the extent and manner in which family is involved with the firm. For instance, Astrachan et al (2002) proposed the F-PEC scale composed of three dimensions, includ-

[1] Specific groups which have common interests in the same knowledge fields, aim exclusively at knowledge sharing, to solve individual or common problems or to develop new knowledge.

ing Power, Experience and Culture. In this study, a multifaceted approach is applied which combines different dimensions into one scale (see appendix 1). This approach is suggested by a more recent study by Uhlaner (2005), using Guttmann scaling techniques. These multiple facets are referred to as family orientation.

Strategy

The concept of strategy has been borrowed from the military and adapted for use in business in order to bridge the gap between policy and tactics, between ends and means. During the development of theories, the definitions of strategy varied in different contexts. The concept of corporate strategy was proposed by Andrews (1980), who considered strategy as the pattern of decisions in a company. Based on the strategy, the vision and mission can be defined. His concept is very similar to Mintzberg's, who thinks strategy is a plan, a pattern in action or a position or a perspective (Mintzberg, 1994). Andrews (1980) also distinguishes corporate strategy from business strategy. Corporate strategy determines the businesses in which companies compete; business strategy defines the basis of competition for a given business. According to Porter (1996), competitive strategy is about being different, about competitive position, about differentiating the firm in the eyes of the customer, and about adding value through a mix of activities different from those used by competitors. He develops three generic strategies for creating a competitive position in a given industry. These are: overall cost leadership which emphasizes on low cost relative to competitors, differentiation which requires the firm to create something unique and focus which reflects whether the firm concentrates on a particular group of customers, geographic markets or product line segments. Porter also proposes a number of competitive "strategic dimensions" which include brand identification, channel selection, technological leadership, cost position, service and leverage, among others (Porter, 1980). Most of current research on strategies are based on his generic strategies and more dimensions are developed and characterized into these generic strategies. Strategic process refers to the formality of approach towards strategy. The company's leadership may have explicit goals, objectives and targets. This directive is typically called the mission or strategy statement (Griffin and Ebert, 1996). However, it is not always the case that firms, especially SMEs, have a formal strategic plan written down. In this study, we develop strategy variables based on Porter's generic competitive strategies and the formality of the strategic approach.

2.1.3 Organizational learning

The notion of organizational learning can be defined as processes or activities (of learning) in the organization, or it can be used to describe certain types of activity taking place in an organization (Ortenblad, 2001). Managers see organizational learning as a powerful tool to exploit its knowledge resources to improve the performance of an organization. Argyris, Schön and Senge have all contributed much in developing theories on organizational learning (Argyris, 1977; Argyris and Schön, 1978, Senge, 1990). Argyris (1977) defines organizational learning as the process of "detection and correction of errors". Based on this view, Argyris and Schön (1978) introduce the concepts of "single-loop" and "double-loop" learning. Single-

loop learning involves the correction of errors through a feedback loop. Double-loop learning is cognitive and goes beyond the immediate solution of problems by developing principles that may inform and determine future organizational behaviour and lead to new ways of doing business (Argyris and Schön, 1978; Argyris, 1992). Senge (1990) proposes that two different processes of organizational change are associated with organizational learning: "adaptive learning" and "generative learning". Adaptive learning is assumed to come along with a lower degree of organizational change in response to the changes in the business environment. It is seen as more automatic and less cognitively induced. It is necessary for survival of the firm but it does not deliver competitive advantage. Generative learning emphasizes building new competences, or identifying and creating opportunities based on leveraging existing competencies, to generate new business for the firm (Senge, 1992). It involves the active integration of new ideas with existing knowledge and to generate new knowledge in the firm. Regardless of the different labels, it is significant that both single-loop learning and adaptive learning focus on detecting and correcting an error or a mistake on existing knowledge in the organization, while double-loop learning and generative learning are keen to improve and create new knowledge by integrating new ideas based on existing knowledge.

Three elements of organizational learning are identified by Stonehouse and Permberton (1999), namely, organizational culture, structure and infrastructure. Organizational culture consists of values, attitudes and beliefs which can influence the actions and behaviour of the individuals of the firm. A learning culture embodies 1) a clear organizational vision; 2) a type of leadership which plays a vital role in steering learning within the organization; 3) encouraging continuous improvement based on sharing ideas and knowledge, trust, questioning and experimentation; 4) openness and tolerance of mistakes and 5) recognition of tacit knowledge (Senga, 1992; Mintzberg et al, 1998; Harvey and Denton, 1999; Stonehouse and Pemberton, 1999). Though there is no single structure that uniquely supports learning, it is argued that flatter organizational structures with reduced cross-function boundaries is more appropriate for a learning culture (Hopper, 1990; Quinn, 1992; Stonehouse and Pemberton, 2000; Pemberton et al, 2001). Infrastructure consists of developed technology in terms of information and communication technology (ICT) and of the informal communication platform. Infrastructure supports organizational learning within and between collaborating firms and transforms the ability of both individuals and organizations to augment their intelligence via accelerated learning (Stonehouse and Pemberton, 2000). ICT has provided the convenient organizational configurations to organizational learning while the informal communication platform is dependent on organizational culture (Stonehouse and Pemberton, 2000). Therefore, organizational culture, structure and infrastructure are interdependent in creating an organizational learning context. In this study, in order to assess organizational learning, a scale variable which collects explicit information about organizational learning context proposed by Stonehouse and Permberton (1999) is developed for organizational learning.

2.2 Research framework and hypotheses

In this section, the research framework and hypotheses are presented. The research framework proposes that organizational learning, strategy and family orientation have a direct effect on knowledge management with the control of general organization context and that organizational learning may also have an indirect effect on knowledge management. A proposed research framework is presented in Figure 2.2.

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Figure 1 about here

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2.2.1 Strategy and knowledge management

As mentioned in the overview of key concepts, the strategy variables used in this study are developed based on Porter's interpretation. 'Price discounting' means that the firm offers goods or services at a lower price to improve and retain competitive advantage. This is somewhat narrowed in concept compared to Porter's cost leadership (Porter, 1980, 1985). 'Innovation orientation strategy' means that a firm continuously offers new and unique products or services for competitive advantage. Kohli and Jaworski (1990) define 'market orientation strategy' as the organization-wide generation of market intelligence that pertains to current and future customer needs, dissemination of intelligence across departments and organization wide responsiveness. It means that a firm focuses on capturing and maintaining new and existing market shares, being proactive to competitors and future customer needs for competitive advantage. The market orientation's external focus on customer needs and competitor capabilities is entirely consistent with the concept of 'differentiation'. Therefore, 'Innovation orientation' and 'market orientation' belong to the category of Porter's differentiation (Porter, 1980, 1985). 'Service orientation' is considered Porter's focus (Porter, 1980, 1985), because it refers to an emphasis on a target group of customers. Formality of approach is about the direction or method that the leadership of the firm chooses to record their strategy. It can be formally written down or rather informal.

Strategy concerns an overall analysis based on internal and external information; it is also a crucial choice made by the owner/manager. The choice made determines the goals regarding the factor of knowledge in the short and medium term and is likely to affect knowledge management practices. From a dynamic capabilities perspective, firms with a more competitive strategy are more likely to perceive the value of knowledge management practices, because knowledge management is a primary predictor of competitive advantage. Firms with innovation orientation strategy are more likely to acquire, create, develop, and retain their unique knowledge in order to result in new products and services. Market orientated firms require well developed knowledge in existing and related markets. They need to know how to develop deep relationships with key customers. By doing so, they can quickly response to the market which has greatest opportunities for profitable growth, as well as profitably develop tailored products and services based on the needs of their customers. Therefore, market oriented firms are keen to develop their market sensing and customer linking capabilities (Day, 1994b). Specific knowledge of market and competitors is re-

quired by such firms; customer information should be stored and well maintained. On the one hand, service orientated firms will also be more likely to pursue knowledge activities in order to provide new services, when they tailoring its strategy to serve a target group of customers. On the other hand, they may be less likely to pursue knowledge activities when they only provide undifferentiated standard services. Simple price discounting is a strategy least likely to pursue knowledge management due to its purpose of lowering overall costs. Therefore, Hypothesis 3 is formulated as follows:

Hypothesis1: Firms following a certain approach to strategy (more innovation orientation, more market orientation, more service orientation and more formal strategic process, or less emphasis on price discounting) are more likely to pursue knowledge management.

2.2.2 Family orientation and knowledge management

Past researchers have drawn upon a wide variety of theories to explain the differences in professionalism of management between family oriented and non-family oriented firms, including agency theory and the resource-based view. Agency theory examines the relationship between principals and agents, often representing owner(s) and manager(s) of an organization. Agency theory is used to study family orientated firms: whenever the owner and manager are part of the same family, the coordination between the two (e.g. through contracts and monitoring) should be more efficient and thus less expensive (Steier, 2003). If the owner and manager are one and the same, monitoring is not even necessary, saving even more on agency costs. With family-owned firms, agency theory predictions have been debated, but it is plausible that this may provide one explanation for the informality often seen within family-owned as compared with non-family firms (De Kok, Uhlaner, and Thurik, 2006). For instance, more family oriented firms may use informal means to pass knowledge and experience from generation to generation (Donckels, 1998;). Therefore, for employees who belong to the same family as the owner and managers, less formal KM practices are required to align the interests of managers and employees. This may also hold for employees who are not related to the owner and/or managers, if family-oriented firms are able to create an organizational culture where all employees feel they belong to the same family (Pollack, 1985).

The resource-based view is based on the assumption that differences in physical, organizational and human resources between firms cause a fundamental heterogeneity in their productive potential (Priem and Butler, 2001). Reid and Adams (2001) find that many family oriented firms use less formal HRM practices, and explain this by suggesting such firms have more limited organizational capabilities. This finding can also be applied to KM practices. Family oriented firms have limitations due to their comparatively smaller size and reduced complexity compared to non-family oriented firms (Daily and Dollinger, 1993; Cromie et al., 1995). Most of the family oriented firms are small. They have limited supply of financial resources and lack specific knowledge (particularly the recognition of the importance of KM issues) which leads to less use of formal KM practices in the family-oriented firm. Family oriented firms are also less complex in structure, it is not necessary for them to build formalized and/or systematized procedures and policies in order to process information more effectively within the firm.

Nooteboom (2001) states that entrepreneurs who emerged from a traditional craft environment are more conservative with their own family traditions, which makes them most unlikely to engage into formal knowledge management practices, compared to a university graduate (manager) who founds a company after resigning from a large firm. From a behavioural perspective, managers usually concentrate more on every aspect of management than entrepreneurs/owners and therefore managers should be expected to focus more on knowledge management. Given the above discussion, Hypothesis 2 is formulated as follows:

Hypothesis 2: The more family oriented the firm, the less likely knowledge management practices are followed.

2.2.3 Organizational learning and knowledge management

It is difficult to clearly distinguish organizational learning and knowledge management because they go hand by hand in practice (Huber, 1991). However, they have different tasks, organizational learning primarily emphasizing on the continuous generation of new knowledge to add to existing stock of assets while knowledge management primarily focuses on the formalization, storage, sharing, distribution, co-ordination, implementation of existing knowledge assets throughout the firm. Both of them serve to build and exploit core competences that yield superior performance. In order to achieve this, they share a organizational context which include the firm's organizational culture, structure and infrastructure (Stonehouse and Pemberton, 2000). The relationship between organizational learning and knowledge management is illustrated in Figure 2.2.

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Figure 2 about here

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The chief aim of organizational learning is the continuous development of new knowledge as well as the more efficient and effective management of the resulting organizational assets. Stonehouse and Pemberton (1999) argue that the firm can increase the effectiveness and the efficiency of learning and knowledge management processes and systems by the organization context. For instance, trust can stimulate knowledge sharing between individuals. A flat network structure appears to facilitate knowledge management more effectively (Quinn, 1992) and infrastructure provides a convenient organizational configuration to knowledge management by means of storage, transfer and sharing.

Lopez, Montes Peon and Vázquez Ordás (2004) state that the organizational learning process defines the quality of knowledge distributed across the organization as well as the effectiveness with which knowledge is put to use on the one hand. On the other hand, they argue that knowledge management is the initiative stage for organizational learning by empirically analyzing large Spanish firms based on Duns & Bradstreet database. This argument is also supported by Cegarra-Navarro's (2005) empirical work by using data of 139 companies of the Spanish optical sector. Therefore, it is argu-

able that organizational learning has significant bearing on knowledge management. In this study, organizational learning is considered as a predominant factor to knowledge management. To summarize, Hypothesis 1 can be formulated as follows:

Hypothesis 3: Organizational learning can increase the effectiveness and the efficiency of knowledge management.

3 Methodology

3.1 Sample and data collection

This study makes use of a subset of a sample tracked longitudinally by EIM Business Policy and Research since 1998. The sample is stratified according to sector and size classes (0-9, 10-49 and 50-99 employees in FTEs). For this particular study, only independent companies were included with at least four employees. This resulted in an available sample of 496 firms. Data was collected via several rounds of telephone (computer-aided) interviews in 2006.

3.2 Models and variables

In order to test the proposed hypotheses, we estimated the following models:

$$KM = \beta_0 + \beta_1 \cdot OL + \beta_2 \cdot FO + \beta_3 \cdot Strategy + \beta_4 \cdot Ownership + \beta_5 \cdot Context + \varepsilon \quad \text{(I)}$$

$$KM = \beta_0 + \beta_1 \cdot OL + \beta_2 \cdot Context + \varepsilon \quad \text{(II)}$$

$$KM = \beta_0 + \beta_1 \cdot FO + \beta_2 \cdot Context + \varepsilon \quad \text{(III)}$$

$$KM = \beta_0 + \beta_1 \cdot Strategy + \beta_2 \cdot Context + \varepsilon \quad \text{(IV)}$$

$$KM = \beta_0 + \beta_1 \cdot Strategy + \beta_2 \cdot OL + \beta_3 \cdot Context + \varepsilon \quad \text{(V)}$$

Where *KM*= knowledge management variable, *OL*= organizational learning variable, *FO* = family orientation variable, *Strategy* = strategy variables, *Ownership* = ownership variables, *Context* = general context variables.

To construct these variables, a variety of techniques, including Principal Components Analysis (with an orthogonal rotation), testing for reliability using the Cronbach-alpha reliability coefficient, correlation between the variables, and a check for face validity, were used in combination to form the scales. Variables based on items with scales of the same length were created by taking the mean of different items. Variables that required a combination of items based on items of different lengths made use of the protocol referred to as categorical principal components analysis (CATPCA) which was executed using the Statistical Package for the Social Sciences (SPSS). Appendix 1 provides a more extensive description of each variable.

3.2.1 Knowledge management and organizational learning

A Principal Components Analysis on knowledge management and organizational learning items combined was used to create variables for knowledge management and organizational learning. Table 1 shows the results for this analysis. Although it was expected initially that the different KM processes (acquisition, sharing, storage) would load on different factors, results of a PCA reveals one primary KM factor, consisting of nine items (Cronbach's alpha= 0.80). Furthermore, factor analysis suggests a three item variable for organizational learning (Cronbach's alpha = 0.57). Both variables were created as the mean of the corresponding items.

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Table 1 about here

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3.2.2 Family orientation

The family orientation variable was created using Principal Components Analysis, resulting in a six item variable (Cronbach's alpha = 0.75), including items on family relations, family influence, succession intention and ownership. CATPCA was used to create scales.

3.2.3 Strategy

Strategy is modeled through the following variables: innovation orientation strategy, marketing orientation strategy, service orientation strategy, price discounting strategy and formality approach. Innovation orientation strategy and marketing orientation strategy variables were created using Principal Components Analysis. For innovation strategy this resulted in a seven item variable, including items on attitude towards innovation of products, services or production processes and expected investments in innovations (Cronbach's alpha of 0.69). The marketing orientation strategy variable is composed of four items, including items on marketing activities and competitors (Cronbach's alpha of 0.68). CATPCA was used to create scales were used. Single item variables were used for the other strategy variables.

3.2.4 General context variables

Company size, the natural logarithm of age and sector (manufacturing, construction, retail & wholesale and services), and ownership structure as general context variables. Ownership structure comprises: number of owners, number of managers and combined director and ownership (all single item variables).

3.3 Data Analysis

Bivariate relationships are first examined using Pearson product-moment bivariate correlation statistics. Tests for multicollinearity, using VIF scores were carried out. A multivariate model (I) is then developed using Ordinary Least Squares multiple regression. Furthermore, in interpreting possible direct and indirect effects of the combined results, a protocol for testing for mediating or intervening effects is used based on approaches by James and Brett (1984) and Baron and Kenny (1986) as follows: We first estimate three separate models: y=f(x), y=f(m) and y=f(x,m). We assume the presence of a mediating effect when the following requirements are met: a) a significant effect of m on y in the model y=f(m); b) a significant effect of x on y in the model y=f(x); and c) a significant decrease of the effect of x on y in the model y=f(m,x) compared to y=f(x) – a decrease is considered as significant if it is larger than 2 times the standard error of the coefficient for x. Likewise, we assume the presence of a direct effect in the case of a significant effect of x on y in the model y=f(x) in combination with a significant added effect of x on y in the model y=f(m,x).

4 Results

4.1 Descriptive statistics and bivariate relationships

Table 2 presents frequencies for all knowledge management questions. Based on this study, it appears that the most common strategy (applicable to a very large extent or completely applicable) for acquiring knowledge is staying in touch with professionals and experts outside the company (53%). Regarding sharing of knowledge, the most commonly cited practice is for employees to share knowledge and experience by talking to each other (80% of respondents judging this completely applicable or applicable to a very large extent in their firm). The most common storage practice is that the knowledge gained within the firm is stored in formal repositories (57%).

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Table 2 about here

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Table 3 presents the descriptive statistics for the variables used in this study, including the mean and standard deviation. Table 3 also presents the correlations among all variables used in the study. None of the correlations exceed 0.6, so this indicates no problems with multicollinearity between items. Furthermore, variance inflation factor (VIF) scores are computed for each of the regressions below, and range from 1.01 and 1.57, also suggesting that the analysis should not be seriously distorted by multicollinearity.

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Table 3 about here

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4.2 Hypothesis 1: relationship between strategy and knowledge management

Hypothesis 1 predicts a positive relationship between certain approaches to strategy and knowledge management. Model 4 shows a significant positive (unstandardized) coefficient for innovation strategy (B=.34, p<.001, table 4), marketing strategy (B=.22, p<.001) and formality approach (B= .29, p<.001. This effect remains significant (B=*.23,* p<.001 for innovation strategy, B=*.22,* p<.001 for marketing strategy and B=*.26,* p<.001 for formality approach) in the full model (Model 1). Hence hypothesis 1 is supported. (See Table 4).

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Table 4 about here

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4.3 Hypotheses 2: relationship between family orientation and knowledge management

Hypothesis 2 predicts a negative relationship between family orientation variables and knowledge management. Model 3 shows a negative (unstandardized) coefficient for family orientation B=-.15 (p<.001, table 4). This

effect remains significant *B*= -.13 (p<.001) in the full model (Model 1). Hence hypothesis 2 is supported. (See Table 4).

4.4 Hypothesis 3: relationship between organizational learning and knowledge management

Hypothesis 3 predicts a positive relationship between organizational learning and knowledge management. Table 4 shows results of a series of regression analyses used to test this hypothesis. Model 2 shows a positive (unstandardized) coefficient for organizational learning B =.41 (p<.001, table 4). This effect remains significant *B*=.21 (p<.001) in the full model (Model 1). So a direct relationship is supported. Furthermore, there is also support for an indirect effect mediated by strategy, since adding strategy to the model leads to a significant decrease in the unstandardized (B) coefficient for organizational learning (comparing B=0.41 in model 2 and B=.25 in model 5).

5 Discussion

5.1 Research questions

The aim of this study is to test a preliminary model that not only addresses the prevalence of different KM techniques but also the determinants of KM, in a random sample of Dutch SMEs.
By analyzing the available sample of 496 firms, the first research question of how do SMEs manage their knowledge is answered. Based on frequencies, it appears that SMEs are most likely to acquire knowledge by staying in touch with professionals and experts outside the company. This phenomenon can be explained by the organization context of SMEs. SMEs have limited resources compared to large firms. Therefore it is impossible for SMEs to embrace all required resources. Sometimes it is difficult for SMEs to attract new resources, such as new employees, given the size of the firm and less formal structure. SMEs are more likely to share and develop knowledge by informal discussion among employees. From the resource-based view, SMEs have limited organizational capabilities due to their small size. Due to limited financial support and less complex structure SMEs are less likely to pursue formal knowledge management practices. Therefore, informal discussion or talking to each other could be a best practice for SMEs to share and develop knowledge. However, an interesting result generated in this study is that SMEs seem to be more likely to store their knowledge in a formal method for instance database. This result indicates that owner/managers of SMEs start to be aware of the crucial fact caused by employee resignations and on retirement. Some positions in SMEs are not replaceable. Therefore once they lose an employee in a particular position they may lose the knowledge as well. It is necessary for SMEs to store knowledge in a more formal way in order to minimize the impact by losing employees.

The second research question is answered by testing hypothesis 1 and 2. Regarding the relationship between strategy and KM strategies, the analysis indicates that innovation orientation strategy, marketing orientation strategy and formality strategic process are positively conducive to knowledge management. Furthermore, more family orientated firms are less likely to pursue knowledge management. These results support Hypothesis 1 and 2. Both innovation orientation and marketing orientation require new specific knowledge to provide new products and services, and both of them need to retain unique knowledge to maintain the competitive advantages. Therefore, knowledge management is important for them. It is significant that a written strategy or mission statement is positively conducive to knowledge management. Porter (1996) proposes that strategy is creating a fit among a company's activities; it is about integrating activities to achieve success. Strategy gives information such as what to do, what not to do, which resources are required, and how to allocate resources effectively. Strategy is dynamic, which requires owner/manager to continually search for ways to reinforce and extend the company's position. In order to do this, a written strategy is helpful. A written strategy can also serve as a guideline for the owner-manager to allocate the resources and activities effectively. Service

orientation strategy and price discounting do not have a significant impact on knowledge management in this study. More family orientated firms are less likely to follow knowledge management due to its small size, less financial resources, less human resources and less complexity.

The third research question is answered by a positive relation between knowledge management practice and organizational learning (hypothesis 3). Furthermore, a direct as well as an indirect effect of organizational learning is identified in our analysis. The empirical results support that organizational learning increases the effectiveness and the efficiency of knowledge management and can leverage the quality of knowledge in the firm. The results recommend that owners/managers of SMEs not only focus on knowledge practices but that they also are more proactive in detecting and correcting existing knowledge and develop new knowledge based on it. A sequential and routinized knowledge management process does not guarantee the competitive advantage of firms; However a cumulative knowledge management process may have a significant impact. The indirect effect of organizational learning through strategy is identified by our analysis. As discussed in the concept of organizational learning, a clear organizational vision can provide focus in the context of learning and learning-related activities. Organizational vision should be formulated based on an explicit strategy.

5.2 Limitations and suggestions for future research

This study is conducted empirically based on large, randomly drawn samples from multiple sectors. The results of this study are consistent with other research. Therefore, this study can be a strong support for other researches which are based on small sample or case studies. Though the results are significant, there are still some limitations in this study which can be considered for future research.

First, both knowledge management and organizational learning are broadly defined concepts. Due to limited time allocated to these questions in the telephone interview, the choice of knowledge management practices is limited, as is the choice for organizational learning. Moreover, this study does not include all categories of knowledge management. For instance, enabling phase is excluded in this study. Therefore, it is recommended that future research be conducted with a larger sample and including a more varied set of practices for each category of knowledge management and of organizational learning.

Second, compared to practices of knowledge management, knowledge management policies which are embodied into organizational culture are more influential for managing tacit knowledge. For instance, promoting a knowledge sharing culture can make knowledge sharing more effectively; motivating employees to remain with firms can help firms to keep tacit knowledge. Empirical work by Lopez, Montes Peon and Vázquez Ordás (2004) supports that knowledge management policies, which they refer to as a collaborative culture, are a means to leverage knowledge through organizational learning. Therefore, it could be a possible interrelation between organizational learning and knowledge management policies and practices. A

suggestion for future research is to take knowledge management policies into account, in order to test a more complete interrelation between organizational learning and knowledge management.
Third, in this study, a scale combining different knowledge management practices is used. However, the model might vary if tested for individual practices. Future research might examine different KM practices in more detail.

Fourth, longitudinal research could be conducted to provide a better understanding of the directions of cause and effect among the proposed relations.

Fifth, future research could test for the relation between knowledge management, organizational learning, family orientation, strategy and firm performance.

5.3 Conclusion

The purpose of this study was to identify certain antecedents and/or correlates of knowledge management, using a large sample of Dutch SMEs. In particular, various strategy variables, organizational learning as well as a family orientation index are used to predict knowledge management, while controlling for various context variables including firm size, age, ownership and sector. Indeed, in this study, empirical support is found for a positive relationship between knowledge management and each of the following variables: organizational learning, innovation orientation strategy, market orientation strategy and a more formal strategic plan. Consistent with other research on family orientation and aspects of organization, a negative relationship was found between family orientation and the use of knowledge management. Future research can improve in many ways on the results presented here by using longitudinal data, examining knowledge management practices in greater detail. However, given the limited number of empirical studies to date, the present study provides some useful guidelines for future research.

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Figure 1: Proposed research framework

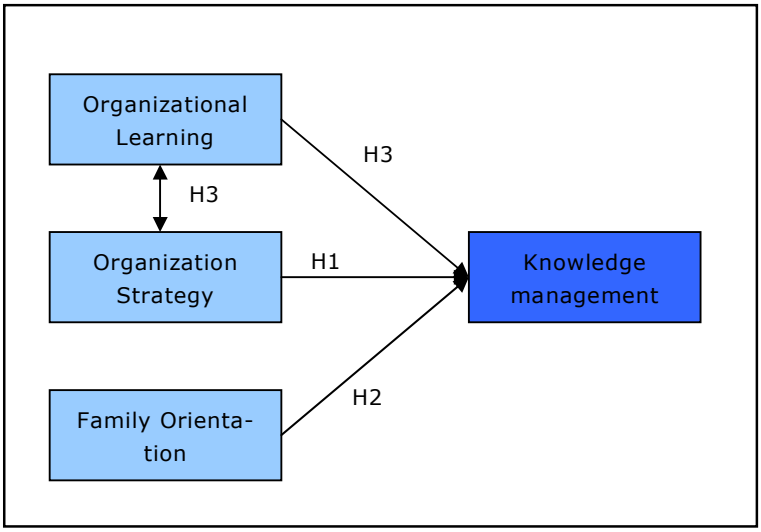

Figure 2: The relationship between organizational learning and knowledge management (Stonehouse and Pemberton, 2000)

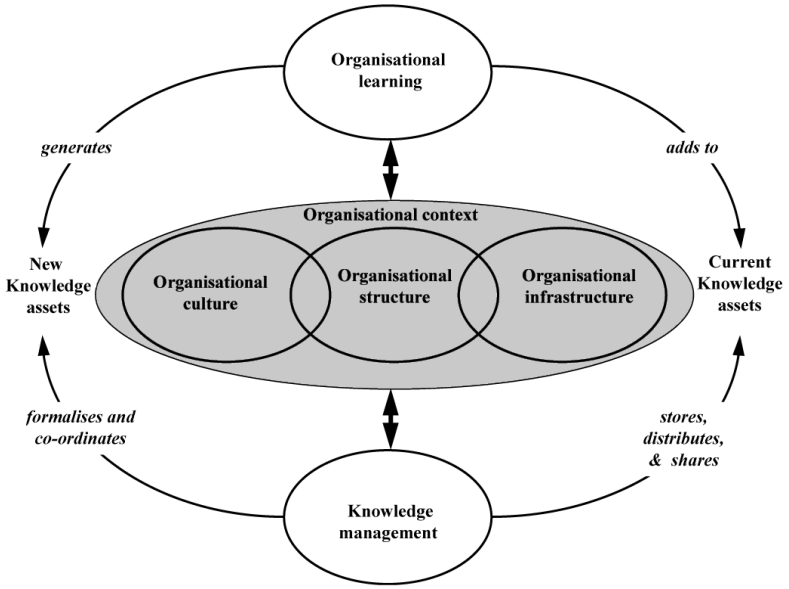

Table 1: factor analysis results knowledge management and organizational learning variables.

			Component				
			1	2	3	4	5
Knowledge management	acquisition	Our company collaborates with other organizations (companies, universities, technical college) through alliances.	.587				
		The organization encourages employees to join formal or informal networks outside the organization	.704				
		Sending employees to exhibitions, congresses or seminars on a regular basis.	.732				
		Staying in touch with professionals and experts outside the company	.633				
		To stay in touch with new developments, our company hires new employees with particular expertise.	.576				
	sharing	Director (management) holds frequent meetings with employees to share recent discoveries and insights.		.676			
		The company has special procedures or other ways to guarantee the sharing of best practices among members of the organization.					
		Certain individuals are responsible for collecting and sharing employees' ideas.					
		Employees share knowledge and experience by talking to each other.		.735			
		People work a lot in groups here as a way to learn from each other.	.440				
		Job rotation is used extensively to help people learn about different parts of the organization.			.656		
	storage	Knowledge gained within the firm is frequently stored in formal repositories (written notebook, or computer database) so people can use them later on.	.473				
		All the employees in the organization have access to the organization's databases through some kind of network.	.591				
		If certain key people left, it would leave large holes in the knowledge needed to run this place.					.606
		When employees leave, we often find ourselves contacting them (by email or phone) to ask about how they did things around here.					.663
	General	Knowledge is managed in a proactive and strategic manner to enhance our competitive advantage.	.421				
Organizational learning		Rewards are given to employees who come up with ideas to improve the business.			.637		
		This company relies a lot on nonmanagement employees to come up with new ideas or other improvements for the business		.592			
		Development of new ideas is not primarily the responsibility of the director/top management.				.776	
		People in this organization seem to be reluctant to share knowledge with each other to solve problems				.490	
		Cronbach's alpha	.799	.571	.317	.134	.201

Table 2: frequencies (%) for all knowledge management questions used in this study.

	question	frequency (%)
acquisition	Our company collaborates with other organizations (companies, universities, technical college) through alliances.	41
	The organization encourages employees to join formal or informal networks outside the organization	19
	Sending employees to exhibitions, congresses or seminars on a regular basis.	29
	Staying in touch with professionals and experts outside the company	53
	To stay in touch with new developments, our company hires new employees with particular expertise.	33
sharing	Director (management) holds frequent meetings with employees to share recent discoveries and insights.	68
	The company has special procedures or other ways to guarantee the sharing of best practices among members of the organization.	44
	Certain individuals are responsible for collecting and sharing employees' ideas.	26
	Employees share knowledge and experience by talking to each other.	80
	People work a lot in groups here as a way to learn from each other.	35
	Job rotation is used extensively to help people learn about different parts of the organization.	18
storage	Knowledge gained within the firm is frequently stored in formal repositories (written notebook, or computer data-base) so people can use them later on.	57
	All the employees in the organization have access to the organization's databases through some kind of network.	46
	If certain key people left, it would leave large holes in the knowledge needed to run this place.	38
	When employees leave, we often find ourselves contacting them (by email or phone) to ask about how they did things around here.	5
general	Knowledge is managed in a proactive and strategic manner to enhance our competitive advantage.	50

table 3: Mean, standard deviation and Pearson correlations for all variables in the study (n=496)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Knowledge management	1.00															
2. Organizational learning	0.37***	1.00														
3. family orientation	-0.24***	0.04	1.00													
4. innovation strategy	0.47***	0.30***	-0.11*	1.00												
5. marketing strategy	0.43***	0.27***	-0.07	0.36***	1.00											
6. service strategy	-0.01	0.00	0.02	-0.02	0.04	1.00										
7. price discounting strategy	-0.01	0.04	0.01	0.02	0.14**	0.18***	1.00									
8. formality approach	0.36***	0.18***	-0.15***	0.23***	0.25***	-0.01	0.03	1.00								
9. number of owners	-0.15**	0.03	0.06	-0.08	-0.04	0.10*	0.07	-0.11*	1.00							
10. number of managers	-0.27***	-0.08	0.07	-0.19***	-0.16***	0.04	-0.02	-0.18***	0.25***	1.00	0.13					
11. combined CEO/ownership	-0.14**	-0.01	0.28***	-0.04	-0.02	0.00	-0.01	-0.10*	0.10*	0.13**	1.00					
12. size	-0.31***	-0.08	0.17***	-0.22***	-0.16***	0.00	-0.02	-0.26***	0.18***	0.51***	0.25***	1.00				
13. age	0.02	0.06	-0.10*	-0.05	0.00	0.06	-0.08	0.11*	-0.08	0.13**	0.07	0.18***	1.00			
14. Manufacturing sector	-0.05	-0.03	0.03	-0.11*	-0.03	0.07	-0.09*	0.00	-0.03	0.03	0.05	0.03	0.13**	1.00		
15. construction sector	0.15***	0.07	-0.08	0.16***	0.19***	-0.04	-0.01	0.06	0.02	-0.02	0.02	-0.03	0.09*	-0.17***	1.00	
16. Retail & wholesale sector	0.06	0.00	-0.05	-0.01	-0.13**	-0.10*	-0.03	-0.01	-0.06	-0.02	-0.12**	-0.09*	-0.01	-0.30***	-0.31***	1.00
Mean	3.25	2.13	-0.20	-0.16	-0.22	1.03	1.11	1.48	1.70	2.09	1.05	2.45	25.73	0.14	0.15	0.36
Standard deviation	0.91	0.89	1.07	0.93	0.94	0.17	0.32	0.51	0.71	0.81	0.22	0.94	27.93	0.35	0.36	0.49

*:p<.05; **:p<.01; ***: p<.001, two tailed tests of significance.

table 4: regression results for the various models (n=496)

	All		OL + context		FO + context		strategy + context		OL + strategy + context	
	Model 1		Model 2		Model 3		Model 4		Model 5	
explanatory variables	b-value	t-value	b-value	t-value	b-value	t-value	b-value	t-value	b-value	t-value
constant	3.06***	9.65	2.84***	25.47	3.68***	38.26	3.22***	15.10	2.75***	12.94
organizational learning (OL)	0.21***	5.46	0.41***	12.86					0.25***	8.25
family orientation (FO)	-0.13***	-4.01			-0.15***	-5.35				
strategy										
innovation strategy	0.23***	6.13					0.34***	10.90	0.29***	9.36
marketing strategy	0.22***	5.77					0.22***	7.07	0.18***	5.76
service strategy	0.07	0.39					-0.05	-0.34	-0.06	-0.41
price discounting strategy	-0.16	-1.57					-0.12	-1.57	-0.12	-1.62
formality approach	0.26***	3.81					0.29***	5.13	0.28***	5.18
ownership structure										
number of owners	-0.07	-1.55								
number of managers	-0.09*	-2.04								
combined CEO/ownership	-0.09	-0.60								
general context										
size	-0.07	-1.73	-0.26***	-8.85	-0.25***	-7.84	-0.11***	-3.78	-0.12***	-4.40
age	0.00	-0.04	0.00	1.18	0.00	1.10	0.00	0.94	0.00	0.45
Manufacturing sector	0.09	0.93	0.10	1.13	0.07	0.73	0.12	1.53	0.11	1.47
construction sector	0.19	1.87	0.43***	4.74	0.42***	4.27	0.20*	2.37	0.20*	2.50
Retail & wholesale sector	0.20**	2.72	0.16*	2.42	0.16*	2.21	0.23***	3.82	0.20**	3.34
R-square	0.44		0.27		0.15		0.39		0.44	
Adjusted R-square	0.42		0.27		0.15		0.39		0.43	
F-Statistic	25.18		49.95		24.01		51.36		56.83	
DF	15,480		6,803		6, 803		10,795		11,794	

*:p<.05; **:p<.01; ***: p<.001, two tailed tests of significance

appendix 1: detailed description of variables used

Variable	Description of Variable
knowledge management	
knowledge management α=.80	For knowledge management, the mean of the following nine questions was computed: 1. Our company collaborates with other organizations (companies, universities, technical college) through alliances. 2. The organization encourages employees to join formal or informal networks outside the organization 3. Sending employees to exhibitions, congresses or seminars on a regular basis. 4. Staying in touch with professionals and experts outside the company 5. To stay in touch with new developments, our company hires new employees with particular expertise. 6. People work a lot in groups here as a way to learn from each other. 7. Knowledge gained within the firm is frequently stored in formal repositories (written notebook, or computer database) so people can use them later on. 8. All the employees in the organization have access to the organization's databases through some kind of network. 9. Knowledge is managed in a proactive and strategic manner to enhance our competitive advantage. The items were answered with the following scale: (1='very much applicable'; 2='to a very large extent'; 3='to some extent'; 4='hardly';5='totally not applicable')
organizational learning	
organizational learning α=.57	For organizational learning, the mean of the following three questions was computed: 1. This company relies a lot on nonmanagement employees to come up with new ideas or other improvements for the business. 2. Director (management) holds frequent meetings with employees to share recent discoveries and insights. 3. Employees share knowledge and experience by talking to each other. The items were answered with the following scale: (1='very much applicable'; 2='to a very large extent'; 3='to some extent'; 4='hardly';5='totally not applicable')
Family orientation	
Family orientation α=.75	This scale was created by combining answers to the following six questions using the CATPCA technique: The following questions were answered with the following scale: (1='yes', 2='no') 1. The owners are related to each other? 2. The managers are related to each other? 3. The CEO is related to the owner. 4. Would you describe your company as a family business? The scales for the following items are indicated below each question or set of questions: 5. What is the likelihood of management transfer to family member

	of owner? (1='probably'; 2='maybe'; 3='maybe not'; 4='probably not') 6. To what extent do family members determine strategy? (1='to a large extent'; 2='to some extent'; 3='to a very limited extent'; 4='not')
strategy	
innovation strategy α=.69	This scale was created by combining answers to the following seven questions using the CATPCA technique: The following question was answered with the following scale: (1='yes'; 2='no') 1. Does the company emphasize on renewal of products, services or industrial processes. The following questions were answered with the following scale: (1='very much applicable'; 2='to a very large extent'; 3='to some extent'; 4='hardly';5='totally not applicable') 2. Within our company, people constantly think about new products or services, that serve future needs. 3. Within our company, there is emphasis on bringing in new customers with new needs. The following questions were answered with the following scale: (1='certainly'; 2='probably'; 3='not') 4. Are you going to invest in new products or services in the next 12 months? 5. Are you going to invest in improving or renewing internal industrial processes in the next 12 months? 6. Are you going to start or do risky projects in the next 12 months? 7. Are you going to take initiatives to differentiate from the competitors in the next 12 months?
marketing strategy α=.68	This scale was created by combining answers to the following four questions using the CATPCA technique: The following question was answered with the following scale: (1='yes'; 2='no') 1. Does the company emphasize on marketing activities aimed at improving sales performance? 2. Are there in the company employees –including CEOs or owners- who work on marketing activities in their daily profession? The following questions were answered with the following scale: (1='very much applicable'; 2='to a very large extent'; 3='to some extent'; 4='hardly';5='totally not applicable') 3. Within our company, we regularly exchange information regarding strategies of our competitors. 4. The management regularly discusses strengths of our competitors.
service strategy	Does the company emphasize on excellent service for customers. (1='yes'; 2='no')
price discounting strategy	Does the company emphasize on costs optimization. (1='yes'; 2='no')
formality approach	Is the competitive strategy for your business written down? (1='yes'; 2='no')
ownership structure	
number of	How many owners does the company have?

owners	(1='1';2='2';3='more than two')
number of managers	How many managers does the company have? (1='1';2='2';3='more than two')
combined CEO/owner	The CEO is owner or co-owner. (1='yes'; 2='no')
general context	
size	Computed as the natural logarithm of the response to the following question. How many persons does the company employ?
age	Computed as the difference between founding year and 2006.
manufacturing sector	Is the company operating in the industrial sector? (1='yes'; 2='no')
construction sector	Is the company operating in the construction sector?(1='yes'; 2='no')
retail and whole sale sector	Is the company operating in sales or repair of consumer products? (1='yes'; 2='no')

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